

REMARKS

The Legal Instruments Examiner issued a Notice of Non-Compliant Amendment on January 2, 2004, requesting Applicant to resubmit the amended paragraphs to the specification and claims filed in their Amendment and Response to Office Action Mailed August 25, 2003 (copy attached as Exhibit A) in the form requested by the Patent Office. Applicant resubmits herewith the amended paragraphs and claims as requested.

Applicant submits that these minor amendments and corrections herein are made without prejudice, and that no new matter has been added. Applicants respectfully request that their Amendment and Response to Office Action Mailed August 25, 2003, be entered.

Respectfully submitted,

Jan 23, 2004

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CERTIFICATE OF FACSIMILE UNDER 37 CFR 1.8(A)

I hereby certify that this correspondence is being forwarded by fax to Examiner Gladys J. Piazza Corcoran, Group Art Unit 1733, at fax no. (703) 872-9701, c/o Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date of Deposit: 11-10-2003 By: Dora Ror

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**IN RE APPLICATION OF**

**DOCKET NO. TA-00414**

Ronald P. Schmidt

SERIAL NO.: 09/761,301

EXAMINER: Gladys J. Piazza Corcoran

FILED: 01/16/2001

GROUP ART UNIT: 1733

**TITLE: System and Method of Forming Structural  
Assemblies With 3-D Woven Joint Pre-Forms**

**AMENDMENT AND RESPONSE  
TO AUGUST 25, 2003 OFFICE ACTION**

Mail Stop: Amendment – No Fee  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed August 25, 2003, please amend the specification, proposed drawings, and claims of the above-identified application as follows:

AMENDMENT TO THE SPECIFICATION

Please enter the follow amendments to the specification:

Page 9:

Curing in place allows compliant pressure intensifiers 18 to force the flexible uncured woven pre-form 14 against adjacent sub-assemblies 12 thus conforming to severe contours and angles. Additionally, the compliant pressure intensifiers 18 can be inexpensively manufactured as exact fit is not required since the uncured pre-forms 14 can conform to the sub-assemblies 12. Each pressure intensifier 18 is a three-sided polygon in the cross-section shown in Figure 4, defining a triangular configuration. Each pressure intensifier 18 has a straight base side 19 that contacts base 13. A straight leg side 21 contacts the exterior surface of pre-form leg 15. An exterior side 23 joins the edges of base side 19 and leg side 21. A plane line 25 that is normal to exterior side 23 21 equally bisects the corner formed by leg side 21 and base side 19. When positioned adjacent pre-form 14 prior to curing, the plane that is normal to exterior side 23 also equally bisects a corner formed by base 13 or base 19 and one of the legs 15. In the embodiment of Figure 4, base side 19 and leg side 21 are 90° relative to each other and of equal lengths. Exterior side 23 is preferably concave.

**AMENDMENT TO THE DRAWINGS**

Please review the proposed amendments to the drawings. The proposed amendments to the drawings in response to this office action are based upon the drawings filed May 1, 2001, which amended the drawings as originally filed.

Figures 1A-1E had been amended in the formal drawings to add the words "prior art." Figure 1C of the May 1, 2001, drawings now further propose an amendment to reflect the Examiner's rejection. Figures 2 & 3 of the May 1, 2001 drawings propose an amendment to add the words "prior art." Figure 4 of the May 1, 2001 drawings propose amendments to add numbers 15, 17, 19, 21, and 23, and delete the tapered edges of pressure intensifier 18. Figure 6B & 9B of the May 1, 2001 drawings each propose an amendment to add the words "prior art." Figures 7A-D of the May 1, 2001 drawings propose an amendment to reflect the pre-form configuration shown in the original drawings. Figure 9A of the May 1, 2001 drawings propose an amendment to remove the adhesive on the bottom portion of the vertically shown pre-cured assembly. Figure 10 of the May 1, 2001 drawings propose an amendment in reference 40 to reflect the pre-form configuration shown in the original drawings.

AMENDMENT TO THE CLAIMS

Please amend the claims as set forth below:

1-12. (Previously Canceled)

13. (Previously Amended) A method of forming a structural assembly, comprising the step of:

affixing a first pre-cured assembly to a 3-D woven textile pre-form impregnated with an uncured resin, ~~an adhesive film~~ being located between said first pre-cured assembly and said pre-form, said pre-form having a base and two legs extending from the base, said first pre-cured assembly being located on a side of the base opposite the legs;

affixing a second pre-cured assembly between said legs of said 3-D woven textile pre-form with an additional adhesive film being located between said second pre-cured assembly and inner surfaces of said legs of said pre-form;

curing said resin and said adhesive films to form the structural assembly; wherein  
said curing is performed by placing a leg side of a first pressure intensifier of flexible material against an exterior surface of one of said legs and placing a base side of said first pressure intensifier against said base, and placing a leg side of a second pressure intensifier of flexible material against an exterior surface of the other of said legs and placing a base side of said second pressure intensifier against said base, each of said pressure intensifiers having an exterior side that extends from an edge of said base side to an edge of said leg side; and

inserting said first and second pre-cured assemblies along with said pre-form, adhesive films, and pressure intensifiers into a vacuum bag, then evacuating the vacuum bag, causing the pressure intensifiers to press said base and legs of said pre-form against portions of said pre-cured assemblies.

14. Canceled (Previously Amended) The method of Claim 13, wherein said base side and said leg side of each of said pressure intensifiers are at right angles to each other, and each of said pressure intensifiers is triangular in cross section.
15. (Previously Amended) The method of claim 13, wherein said first pre-cured assembly and said second pre-cured assembly are pre-cured, laminated composite structures.
16. (Previously Amended) The method of Claim 13, wherein said step of curing is implemented with heat and pressure.
17. (Previously Amended) The method of claim 13, wherein said base side and said leg side of each of said pressure intensifiers are equal in length.
18. (Previously Amended) The method of claim 13, wherein said exterior side of each of said pressure intensifiers is concave.
19. (Previously Amended) The method of claim 13, wherein said step of curing is implemented with an E-Beam resin system.
20. (Previously Amended) The method of claim 13, further comprising the step of applying a composite overwrap ply on said exterior surfaces of said legs of said pre-form prior to pressing said leg sides of said pressure intensifiers against said legs.
21. (Previously Canceled)
22. (Previously Amended) The method of claim 13, wherein said pressure intensifiers are rubber.

*Canc.* 23. (Currently Amended) The method of claim 13, wherein a plane ~~line extending~~ normal to said exterior side of each of said pressure intensifiers passes through a corner formed by a junction of said base with one of said legs.

24. (Previously Amended) A method of forming structural assemblies with pre-cured laminated composite structures, comprising the steps of:

providing a woven textile pre-form with a base and a pair of legs extending from the base at a 90 degree angle, the pre-form being impregnated with an uncured resin;

affixing a first adhesive film between a first pre-cured laminated composite structure and the base of the pre-form;

affixing an additional adhesive film between one side of a second pre-cured laminated composite structure and an inner surface of one of the legs of said 3-D woven textile pre-form, and inserting an additional adhesive film between an opposite side of said second pre-cured laminated composite structure and an inner surface of the other of said legs; then

providing a pair of flexible pressure intensifiers, each being triangular in cross section, and placing one of said pressure intensifiers in contact with said base and an exterior surface of one of said legs and the other of said pressure intensifiers in contact with said base and an exterior surface of the other of said legs; then

enclosing said first and second pre-cured laminated composite structures, said pre-form and said pressure intensifiers within a vacuum bag and evacuating the bag; then

curing said adhesive films and said 3-D woven textile pre-form to form the structural assemblies.

25. Canceled(Previously Amended) The method of claim 24, wherein said each of said pressure intensifiers has a base side that contacts said base of said pre form, a leg side that contacts said exterior surface of one of said legs of said pre form and a concave exterior side that extends from an edge of said base side to an edge of said leg side.

26. (Currently Amended) The method of claim 24, wherein each of said pressure intensifiers has a base side that contacts said base of said pre-form, a leg side that contacts said exterior surface of one of said legs of said pre-form, and an exterior side that extends from an edge of said base side to an edge of said leg side; and wherein

a planeline normal to said exterior side bisects a corner defined by an intersection of said base of said pre-form and one of said legs,

27. (Previously Amended) The method of claim 24, wherein said step of curing is implemented by heating the vacuum bag.

28. (Previously Amended) The method of claim 24, wherein said step of curing is implemented with an E-Beam cure resin system.

29. (Previously Amended) The method of Claim 24, further comprising the step of applying a composite overwrap ply on said exterior surfaces of said legs of said pre-form

30. (Previously Canceled)

31. (Previously Canceled)

32. (Currently Amended) The method of Claim 24, wherein each of said pressure intensifiers has a base side that contacts said base of said pre-form, a leg side that contacts said exterior surface of one of said legs of said pre-form, and an exterior side that extends from an edge of said base side to an edge of said leg side; and wherein

said base side and said leg side of each of said pressure intensifiers are of the same length.

33. (Previously Canceled)

34. (Previously Canceled)
35. (Previously Canceled)
36. (Previously Canceled)
37. (Previously Canceled)
38. (Previously Canceled)
39. (Previously Amended) The method of Claim 24, wherein said legs and said base of said pre-form have tapered edges.
40. (Previously Canceled)
41. (Previously Canceled)
42. (Previously Canceled)
43. (Currently Amended) The method of Claim 24, ~~wherein said~~ wherein said pressure intensifiers are formed of rubber.
44. (Previously Canceled)
45. (Previously Amended) The method of Claim 13, wherein said pre-form has tapered edges.

46. (Previously Amended) A method of forming structural assemblies with pre-cured laminated composite structures, comprising the steps of:

providing a woven textile pre-form with a base and a pair of legs extending from the base at an angle, defining a slot between them and corners at intersections of the legs and the base, the pre-form being impregnated with an uncured resin;

affixing a first adhesive film between a pre-cured laminated composite first structure and the base of the pre-form on a side opposite the legs;

inserting a pre-cured laminated composite second structure into the slot with additional adhesive films between inside surfaces of the legs and the second structure;

providing a pair of flexible pressure intensifiers, each of the pressure intensifiers being a three-sided polygon in cross-section, having two straight inner sides intersecting each other, defining a corner portion and an exterior side that extends between edges of the inner sides, and placing the corner portion of each in contact with one of the corners formed by the base and the legs; then

inserting the first and second structures, along with the pre-form, adhesive films and pressure intensifiers into a vacuum bag; and

evacuating the vacuum bag and applying heat to cure said adhesive films and pre-form to form the structural assemblies.

47. (Added) The method of Claim 13, wherein ~~said base side and said leg side of each of said pressure intensifiers are at right angles to each other~~, and each of said pressure intensifiers is triangular in cross section.

48. (Added) The method of claim 24, wherein said each of said pressure intensifiers has a base side that contacts said base of said pre-form, a leg side that contacts said exterior surface of one of said legs of said pre-form and a concave exterior side that extends from an edge of said base side to an edge of said leg side.

REMARKS

As an initial matter, the Applicant wishes to thank the Examiner for providing a copy of the originally submitted drawings and formal drawings. The Applicant has proposed amendments to amended the originally filed drawings in accordance with the Initial Patent Examining Divisions Notice to Follow Corrected Applications Papers filed on February 26, 2001 with the proposed corrections filed on June 24, 2003. The Applicant has amended the specification to satisfy the Examiner's rejection regarding 35 U.S.C. § 132 objections identified in paras. 4-5 of the present office action. The Applicant has correspondingly amended claims 23 and 26 to satisfy any current or potential 37 CFR 1.75(d)(1) objections noted in para. 6. The Applicant has also canceled claims 14 and 25 and resubmitted them as new claims 47 and 48 in accordance with para. 7. Claim 32 has been amended due to an informality. Claim 43 has been amended due to an informality, in accordance with para. 8. The Applicant has also produced supporting arguments regarding claims 17, 23, 24-29, 32, 39, 43, and 46 to satisfy any current or potential 35 U.S.C. § 112 objections identified in para. 10. The Applicant submits that these minor amendments and corrections herein are made without prejudice, and that no new matter has been added. Applicant respectfully requests that the Examiner at least enter this amendment for the purpose of appeal.

The Specification Does Not Introduce New Matter Into the Disclosure.

The specification now recites "a plane that is normal to exterior side 23 equally bisects the corner formed by leg side 21 and base side 19. When positioned proximate pre-form 14, the plane that is normal to exterior side 23 also equally bisects a corner formed by base 13 and the legs 15."

The "plane" identified in the amendment is inherent in the depiction of the drawing as originally filed and would be recognized as such through examination of Figure 4 by one skilled in the relevant art and therefore need not be shown. "Possession may be [and has been] shown . . . by the disclosure of drawings . . . or by describing distinguishing identifying characteristics sufficient to show that the applicant was in possession of the claimed invention. *See* MPEP 2163.02 (emphasis added). "By disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a

patent application necessarily discloses that function, theory, or advantage, *even though it says nothing explicit concerning it*. The application may later be amended to recite the . . . advantage without introducing prohibited new matter. *See MPEP 2163.07(a)* (emphasis added).

Claims 23 and 26 have, thus, been correspondingly amended to reflect the specification, as amended, and should be in allowable form. *See MPEP 2163.04* ("The examiner has the initial burden of presenting by a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims.")

**Claims 17, 23, 24-29, 32, 39, 43, and 46 Satisfy 35 U.S.C. § 112, First Paragraph.**

The Examiner rejected claims 17, 23, 24-29, 32, 39, 43, and 46 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor at the time the application was filed had possession of the claimed invention. Office action, para. 10. Applicant respectfully disagrees. In accordance with the above discussion regarding inherency, the originally filed Figures and/or written description provide sufficient support or suggestion for the subject claims, as currently amended.

Regarding claims 17 and 32, the Examiner rejected said claims asserting a lack of support for the sides of the pressure intensifiers being of equal length. However, though Figure 4 is not drawn with precision, it is clear that the Figure was drawn showing base leg 19 and side leg 21 having equal lengths, thus, this feature is disclosed. Although the Examiner stated that the Examiner saw "no particular significance in the particular shape of the pressure intensifier," Office Action, para. 23, the shape of the pressure intensifiers and the length of their legs can be important as the combination of the shape and leg length can change the direction of the force vector applied to the pre-form.

Regarding claims 23 and 26, the depiction of a line in Figure 4 referenced by the Examiner in the office action has been removed, however, it is clear from the depiction of the exterior side 23 that at the point on the exterior side 23 closest to the corner, formed by a junction of the pressure intensifier base leg 19 or pre-form base 13 with one side leg 23 of the pre-form, a plane normal to the exterior side 23 of the pressure intensifier passes through the corner. The plane need not be explicitly depicted in the figure to support the claim because one

of ordinary skill in the relevant art would understand and recognized its existence from viewing Figure 4 as originally filed. The limitation provided by claims 23 and 26 is such that the exterior side 23 must be shaped such that the plane either passes through (claim 23) or bisects (claim 26) the corner.

Regarding claim 24, the Examiner asserted there was no support for inserting an additional adhesive film between the pre-form and the second pre-cured laminated composite structure. Referring to Figures 4, shown is a first adhesive film 16 (depicted horizontally) affixed between a first pre-cured laminated composite structure 12 (depicted horizontally) and the base 13 of the pre-form 14. Shown also is an additional adhesive film 16 (depicted at least partially vertically) affixed between the left side of a second vertical pre-cured laminated composite structure 12 and an inner surface of one of the legs (left leg 15) of said 3-D woven textile pre-form 14. Shown also is an additional adhesive film 16 affixed between an opposite (right) side of the second vertical pre-cured laminated composite structure 12 and an inner surface of the other leg (right leg 15). Referring to Figure 4, the left and right adhesive films 16 of the vertical second pre-formed laminate composite structure 12 could instead also be a unitary piece forming a U-shape, but the claim is not limited as such. Also, referring to Figure 9C, though dealing with a different embodiment of the present invention, this original figure even more clearly shows that the left and right adhesive films 16 of the vertical second pre-formed laminate composite structure 12 can be in separate pieces.

**Claims 23 and 26 Satisfy 35 U.S.C. § 112, Second Paragraph.**

The Examiner rejected claims 23 and 26 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Office action, para. 11-13. Applicant respectfully disagrees. In accordance with the above discussion regarding inherency, the originally filed Figures and/or written description provide sufficient support or suggestion for the subject claims, as currently amended.

Regarding claims 23 and 26, as discussed above, the depiction of a line in Figure 4 referenced by the Examiner in the office action has been removed, however, it is clear from the depiction of the exterior side 23 that at the point on the exterior side 23 closest to the corner

formed by a junction of the pressure intensifier base leg 19 or pre-form base 13 with one side leg 23 of the pre-form, a plane normal to the exterior side 23 of the pressure intensifier passes through the corner. The plane need not be explicitly depicted in the figure to support the claim because one of ordinary skill in the relevant art would understand and recognize its existence from viewing Figure 4 as originally filed. "The examiner has the initial burden of presenting by a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims." See MPEP 2163.04. This burden has not been met. The limitations set forth in the subject claims are important in that the exterior side 23 must be shaped such that the plane either passes through (claim 23) or bisects (claim 26) the corner.

**Claims 13, 15-18, 22-24, 26, 27, 32, 43, and 46 Are Not Obvious.**

The Applicant respectfully disagrees with the assertion that claims 13, 15-18, 22-24, 26, 27, 32, 43, and 46 are made obvious by Breuer et al. (DE 19832441C1 and U.S. Patent No. 6,306,239) in view of Abildskov (U.S. Patent No. 4,782,864) and Herzberg (U.S. Patent No. 4,966,802) as further taken with Sloman (WO 98/50214). The Examiner states that:

Breuer discloses a method of forming a structural assembly by affixing a first pre-cured assembly (stringer core blanks 5) to a 3-D textile pre-form (stiffening profile members 7) impregnated with an uncured resin (column 4, lines 52-60; column 6, lines 9-26), affixing a second pre-cured assembly (skin member 6) (between the legs) to said 3-D textile pre-form (stringer core blanks 5) (column 5, lines 23-40) and curing the resin to form the structural assembly (column 7, lines 30-55).

Office action, para. 15.<sup>1</sup>

The Applicant respectfully submits that the Examiner is mistaken. Breuer et al. discloses a method of fabricating a stringer-stiffened shell structure, such as an aircraft wing or fuselage, using fiber reinforced composites. Breuer et al. describes positioning a skin member (6) atop a shell mold (1), positioning a narrow edge (51) of a plurality of stringer core blanks (5) in contact with the inner surface of the skin member (6) such that stringer core blanks (5) are parallel each other and with their respective broad side faces (52) facing each other. Figure 3 and Column 5,

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<sup>1</sup> Please note that the Examiner has identified the pre-form as both profile member (7) and blanks (5). The Examiner has also asserted that skin member (6) is between the legs (72) of a 3-D textile pre-form even though skin member (6) is a large curved structure attached to base webs (71). See Figure 3.

lines 45-50. After such positioning is accomplished, Breuer et al. next describes laying stiffening profile members (7) between respective adjacently paired stringer core blanks (5) such that profile member (7) is laid along and in contact with the broad side 52 of respective stringer core blanks (5) and along the adjoining surface of the skin member (6). Figure 3 and Column 6, lines 9-14. The profile members (7) can be U- or L-shaped.

If L-shaped they are positioned as shown in prior art Figure 1 of this application and in Figure 3 of the reference Patent. Profile member (7) is thus not a pre-form having *two* legs extending from a base as required in all of the claims. If U-shaped, the bottom of the U (web (71)) is sufficiently wide enough that each of the vertical protruding webs (72) of the U "run along opposite facing broadsides (52) of two *adjacent* stringer core blanks (5)." Col. 6, lines 43-47.

Thus, Breuer et al. does not, among other things, disclose affixing a second pre-cured assembly *between* the legs (web 72) of a pre-form (profile member (7)), as described in the independent claims 13, 24, and 46, but instead, at best, discloses positioning each of the legs of a profile member (7) between an adjacent pair of pre-cured assemblies (stringer core blanks (5)). Correspondingly, Breuer et al. teaches away from positioning a second pre-cured assembly (stringer core blanks (5)) between the legs of the U-shaped form of profile member (7). Thus, Breuer et al. is not an acceptable reference.

The Examiner acknowledges that Breuer et al. does not disclose a woven 3-D pre-form. The Examiner then further states that:

Abildskov discloses that an improvement of prior art methods [of connecting a spar (4)] with a pair of fabric connectors is to provide one three-dimensional woven fabric connector in order to avoid peel problems of the prior art methods (figures 1, 3; column 2, lines 35-68). . . . [T]he 3-D woven textile pre-form in Abildskov has an additional leg extending from the base, the pre-form is Pi-shaped, and . . . the legs are at a 90 degree angle . . .

Office action, para. 15

Abildskov discloses a 3-D woven fabric connector similar to that depicted in prior art Figure 3 of the application. See Abildskov Figure 1 and Column 2, lines 35-68; Figure 2 and Column 3, lines 1-42. Referring to Abildskov Figure 3, Abildskov further discloses a 3-D woven fabric connector for coupling together a spar (64) to a skin covering (68). The connector consists of three separate sections (72), (76), (80), sections (76), (80) interwoven with section (72).

Column 3, lines 46-50. After the separate woven fabric sections are interwoven, the connector is utilized by bonding section (72) flat against the bottom surface of skin covering (68) followed by *separately* bonding spar (64) to the sections (76) and (80) and to the underside of section (72).

Column 3, lines 55-59.

Abildskov does not teach or suggest a 3-D woven textile pre-form, use of uncured resin, use of an adhesive film, use of pressure intensifiers, curing the spar, skin covering, and 3-D woven fabric connector together. In fact, Abildskov inherently teaches away from such curing, as described in the independent claims 13, 24, and 46, as it appears the spar, skin covering, and 3-D woven fabric connector are cured separately and then individually bonded, the fabric connector to the skin covering, and then the spar to the fabric connector.

The Examiner suggested the combination of the two references teach that:

[i]t would be obvious to one of ordinary skill in the art at the time of the invention to perform the method of forming a structural assembly as shown by Breuer by providing a 3-D woven textile pre-form in a Pi shape in order to overcome peel problems associated with using to fabric pieces . . . as shown by Abildskov.

Office action, para. 15

Applicant respectfully submits that the Examiner is mistaken. The performance of the method of forming a structural assembly as shown by Breuer et al. by providing a 3-D woven textile pre-form in a Pi shape still does not teach affixing a second pre-cured assembly *between* the legs of a 3-D woven textile pre-form, but merely teaches positioning each of the legs of a woven pre-form between an adjacent pair of pre-cured assemblies.

The Examiner next acknowledges that Breuer does not disclose use of adhesive film to provide the bonding between the pre-form and the two pre-cured assemblies. The Examiner then further states that:

Hertzberg discloses it is known in the art to provide an adhesive film between parts of structural assemblies in order to prevent delamination and provide a stronger bond than the prior art methods of only utilizing the resin in the parts for bonding when cured . . . . Hertzberg further discloses that the adhesive film layers are placed between the joint services of the parts of the structural assembly and then the structural assembly is cured . . . .

Office action, para. 15

Hertzberg describes composites made of fiber reinforced resin elements consisting of a plurality of fiber piles (12) which are then later joined by adhesive film. Column 4, lines 8-18.

Herzberg teaches two methodologies of combining the fiber reinforced resin elements. Column 4, lines 47-49. Referring to column 4, lines 49-63 Herzberg first describes pre-curing each of the elements, applying adhesive layers, e.g. 23 and 25, then curing the adhesive layers (pre-cured element-adhesive layer-pre-cured element). Referring to column 4, lines 64 to column 5, lines 8, Herzberg second alternatively describes curing each of the elements and the adhesive layers simultaneously (uncured element-adhesive layer-uncured element).

Hertzberg does not teach or suggest affixing a pre-cured assembly to an uncured pre-form as described in the independent claims 13, 24, and 46. Although Hertzberg deals with pre-cured and uncured assemblies, Herzberg does not disclose using the adhesive layers between pre-cured and uncured assemblies. Thus, inherently, Herzberg teaches against such combination, correspondingly teaching away from the applicant's methodology. Herzberg is therefore, not an appropriate reference.

The Examiner next discusses the pressure intensifier limitation by asserting that:

... it is well known in the art to provide such pressure intensifiers to properly apply pressure against corners of composite materials during curing.

Office action, para. 15.

Using Sloman as an example, the Examiner next states:

Sloman discloses that it is known in the production of composite components to use a pressure transmitter to allow pressure to be applied to the composite components during their molding *in a tool* and for molding techniques that involve the use of a vacuum bag applied to the molding . . . .

Office action, para. 15 (emphasis added).

The Examiner then asserts that:

[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of forming a structural assembly as shown by Breuer, Abildskov, and Hertzberg, with pressure intensifiers on each of the two corner portions of the pre-form . . . in order to provide proper pressure and molding to the corner structure of the composite during vacuum molding . . . .

Office action, para. 15.

Sloman discloses the formation and component make-up of an improved pressure transmitter for application to a laminate in order to provide a relatively smooth surface on the pressure transmitter side of the laminate. Page 1, para. 2. Sloman discloses use of elastomeric

material as a precursor to a curable component (pressure transmitter) which can exhibit elastomeric properties, page 1, para. 3, but which has sufficient rigidity to flatten the surface of a composite component (prepeg lay-up (10)), page 1, para. 2. Sloman further discloses use of a fiber reinforcement in its inner region (16), apparently to supply added rigidity to the pressure transmitter. Page 5, para. 4-5.

Collaterally, Sloman describes use of the pressure transmitter to prevent a wrinkle 24 (Figure 1) in a prepeg lay-up (10), page 6, para. 3, and implementation of the pressure transmitter in the form of intensifier (26) arranged at a corner region (22) of a *tool* (12) to insure appropriate pressure is applied to a concave region (24) of a prepeg lay-up (10), apparently to flatten said surface. Page 6, para. 3, 5, & 6 and Figure 2.

Sloman does not disclose applying a *flexible* or compliant pressure intensifier 18 against flexible uncured woven pre-form 14 to press the pre-form against a plurality of pre-cured sub-assemblies 12 much less application of a pair of pressure intensifiers 18 in order to force the flexible uncured woven pre-form 14 against adjacent sub-assemblies 12, as featured in claims 13, 24, and 46. This is an important feature and novel use of pressure intensifiers 18. Instead of using a fairly *rigid* pressure intensifier (26) to conform a laminate (10) to a corner (22) of a tool (12) to flatten the pressure intensifier side of a corner or concave region (24) of a laminate (10), as taught in Sloman, Applicant uses *flexible* or compliant pressure intensifiers 18 to conform the sides of the base and leg 13, 15 of the pre-form 14 *opposite* the pressure intensifiers 18 to the severe contours and angles of the adjacent sub-assemblies 12. Application, page 9, para. 1.

Additionally, the use of *flexible* or compliant pressure intensifiers 18, rather than fairly rigid pressure intensifiers is an important feature because such pressure intensifiers 18 can be inexpensively manufactured as an exact fit is not required since the uncured pre-forms 14 can conform to the sub-assemblies 12. Though Sloman introduces pressure transmitters made of resin and elastomeric material with a fiber reinforcement therein, the component selection is to allow partial curing at low temperatures followed by a second high temperature curing. This type of complicated process can be necessary where the pressure intensifier must have sufficient rigidity to flatten the non-molded (pressure intensifier side) of the laminate or composite material requiring molding.

Thus, Sloman does not teach or suggest the flexible pressure intensifier or its implementation in accordance with the application. Correspondingly, Sloman therefore teaches away from the method steps described in the independent claims 13, 24, and 46. Sloman is therefore not an appropriate reference.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *See MPEP 706.02(J).*

Applicant respectfully submits the Examiner has failed to meet the first element of a *prima facie* case for obviousness. First, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The Examiner has the burden of showing, as such, and has not met it here. Breuer et al., Abildskov, and Herzberg each tried to solve their own problems in a different way, and Sloman's problem was merely a need to improve a pressure transmitter design and formation. Not only is there nothing explicit in either of the references that would suggest combining them, there is also nothing implicit suggesting combining the references as the combined teachings, knowledge of one of ordinary skill in the art, and nature of the problem to be solved as a whole would not suggest doing so to those of ordinary skill in the art as required in MPEP 2143.01 and *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). As can be seen by reviewing the prior art figures referenced in Applicant's "Background of the Invention," the Examiner has attempted to combine art that Applicant has stated as being insufficient. The combined teachings, knowledge of one of ordinary skill in the art, and nature of the problem to be solved as a whole (solved by forming a structural assembly through use of an uncured woven textile pre-form connecting a plurality of pre-cured assemblies or structures, adhesive strips between the pre-form and pre-cured

assemblies or structures, and a pair of flexible pressure intensifiers) do not suggest combining the references, as the combination would not solve the problem or produce Applicant's invention.

Even if the references somehow could be combined or modified, this still is not sufficient to establish a *prima facie* obviousness unless the prior art also suggests the desirability of the combination. MPEP 2143.01. As stated above, there is no suggestion as to the desirability of the combination. The Examiner's statement, alone, that it would have been obvious to modify Breuer et al. to incorporate the methodologies of Abildskov, Herzberg, and Sloman is insufficient to establish a *prima facie* case of obviousness. MPEP 2143.01 states: "the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish *prima facie* obviousness." And yet, nothing else has been shown by the Examiner. Therefore, in accordance with the above discussion, the Examiner has failed to meet the first element of a *prima facie* case of obviousness.

Second, the combination of a reasonable expectation of success. From the above discussion, it is clear that the combination of the four references would merely produce a woven pre-form whereby each of the legs of a woven pre-form is positioned between an adjacent pair of pre-cured assemblies, whereby the pre-form would have to be pre-cured prior to attaching adhesive film or the pre-cured assemblies would have to be uncured, with the entire structure being cured together, and whereby a pressure intensifier would be used to mold the pre-cured assemblies in a mold prior to attachment to the pre-form. As silly as that sounds, that is what the four references when combined together teach or suggest.

Finally, the references when combined must teach or suggest all the claim limitations. In accordance with the prior discussion of the references involving independent claims 13, 24, and 46, each and every claim limitations is not taught. Accordingly, claims 13, 24, and 46 along with dependent claims 15-18, 22-23, 26-27, 32, and 43 should also be allowable.

The Applicant respectfully submits that the Examiner has inadvertently used improper hindsight vision by using the present application as a road map to somehow improperly arrive at the claimed invention. Because the Breuer et al. patent is unrelated to the methodology used by Abildskov, because Herzberg does not describe implementing adhesive film between a pre-cure and a uncured surface, and because Sloman merely deals with molding a laminate in a mold rather than use on a pre-form, the Applicant submits that the Examiner has merely extracted

elements of Abildskov, Herzberg, and Sloman to build the Applicant's invention. As previously discussed, there is nothing in the references or in the problems that they wished to solve that would provide to one skilled in the art the knowledge necessary (problem or solution) to build the Applicant's invention. MPEP 2145 states this to be an improper rationale for combining references. Thus, the combination of Breuer et al., Abildskov, Herzberg, and Sloman is impermissible. Additionally, the use of improper hindsight can be seen in the rejection of claims 19, 28, 20, 29, 39, 45, 24, 27, and 43 whereby added features require yet an even larger number of references in order to try to piece together the Applicant's invention. Thus, improper hindsight is also used with regard to the following described rejections.

**Claims 19 and 28 Are Not Obvious.**

Claims 19 and 28, dependent upon claims 13 and 24 respectively are nonobvious for the reasons provided above regarding independent claims 13 and 24. Also, the references cited by the Examiner, Leaversuch and Bersuch et al., do not provide suggestion or motivation to combine them with Breuer et al., Abildskov, Herzberg, and Sloman, as required to establish a *prima facie* case of obviousness. For example, Bersuch et al. generally describes curing but apparently only with respect to a 3-D pre-form such as that shown in prior art Figure 3 of the application and with respect to a sandwich panel. Additionally, where Breuer et al. advocates use of an autoclave, col. 7, lines 30-32, Bersuch et al. teaches away from use of an autoclave cure, page 2 para. 1, and is thus not an appropriate reference to combine with Breuer et al. Leaversuch, though introducing a forecast of future electron-beam treatment uses, does not discuss use on a pre-form. Thus, as the Examiner has not established a *prima facie* case of obviousness, claims 19 and 28 should be independently allowable.

**Claims 20 and 29 Are Not Obvious.**

Claims 20 and 29, dependent upon claims 13 and 24 respectively are nonobvious for the reasons provided above regarding independent claims 13 and 24. Also, the references cited by the Examiner, Bersuch et al. and Sheahen et al., do not provide the required suggestion or motivation to combine them with Breuer et al., Abildskov, Herzberg, and Sloman. For example, Bersuch et al. does not appear to describe overwrap plies with respect to the woven 3-D pre-

forms and Sheahen et al. only introduces testing of various attachment configurations and only appears to describe the use of overwrap plies where co-bonding is accomplished between a precured sandwich panel bulkhead web and a precured skin using non-woven pre-forms. Thus, as the Examiner has not established a *prima facie* case of obviousness, claims 20 and 29 should be independently allowable.

**Claims 39 and 45 Are Not Obvious.**

Claims 39 and 45, dependent upon claims 24 and 13 respectively are nonobvious for the reasons provided above regarding independent claims 13 and 24. Also, the addition of the additional references cited by the Examiner, Mueller et al. (U.S. Patent No. 6,173,925) and Morris et al. (U.S. Patent No. 5,944,286) do not fill in the gaps.

Mueller et al. describes a skin-rib structure consisting of fiber composite material in which a suction side skin is connected with suction-side rib sections and a pressure-side skin is connected with pressure-side rib sections, said sections connected together by joints. Mueller et al. does not disclose a pre-form and thus cannot describe a pre-form having tapered edges. The Examiner's reference in Office Action page 12, para. 18 refers to "pre-form (27)." Item (27, 27'), however, are tapered adhesive strips which are not pre-forms. Col. 4, lines 53-60. Conical section (24) is identified as being a fiber composite material, and being conical, is tapered by definition; conical section (24) is, however, also not a pre-form. Col. 4, lines 14-17.

Morris et al. describes a joint assembly for connecting a skin panel (1) to wing ribs (4) via three channel member (5) having channel extensions (6, 7) which maximize the surface area of each of three channel members (5) that is in contact with the inner first surface of the skin panel (1). Morris et al. does not describe a pre-form having tapered edges as channel member 5 having extensions (6, 7) is not a pre-form. Thus, as the Examiner has not established a *prima facie* case of obviousness, claims 45 and 39 should be independently allowable.

**Claims 24, 27, and 43 Are Not Obvious.**

The Applicant respectfully disagrees with the assertion that claims 24, 27, and 43 are made obvious by Breuer et al. in view of Abildskov and Herzberg as further taken with Barnes et al. (U.S. Patent No. 6,007,894). The inadequacies of combining Breuer et al., Abildskov, and

Herzberg have already been discussed with regard to the previously discussed rejection of claims 13, 24, and 46. The Examiner states that:

Barnes discloses a method of curing a structural member by where the pressure against the parts is facilitated by providing a pressure intensifiers (silicone rubber blocks 221) that are triangular in [horizontal] cross-section . . . against a base and the exterior surface of the leg portions of the pre-form (body sheet 53), placing the pressure intensifiers (221), *pre-form* (53) and structural assembly parts (43, 83) in a vacuum bag and evacuating the bag in order to cause the pressure intensifier to press the pre-form against *the other structural assembly parts* . . .

Office action, para. 19, page 15 (emphasis added).

Barnes et al. describes a quasi-isotropic composite isogrid structure (41) used as part of an integrated solar-powered upper stage mirror facet consisting of a common composite sheet for both body (43) and ribs (45) made from multiple sheets or plies of plastic composite tape. Col. 2, lines 35-38 & Col. 4, line 66 to Col. 5, line 6. The ribs are formed by positioning a triangular shaped silicone rubber block (221) having flat sides on a top sheet (53) and folding the sheet (53) around the flat sides of the block (221) to form part of three vertical rib portions (61), one for each of the three sides of the block (221). Col. 8, lines 5-7 & 14-17. The block and top body sheet assembly are then inserted upon the previously laid up body face sheets already stacked upon the layup tool (111). Col. 8, lines 27-30. Intermediate sheets (65, 67, 69, 71, 73, 75, 77, 79) are then inserted between the vertical rib portions (61, 63) to form rib (45). See Figure 1 & Col. 8, lines 36-38.

If sheet (53) is to be considered Applicant's claimed pre-form 14 and block (221) is to be considered Applicant's claimed pressure intensifier 18 then Barnes et al. does not teach or suggest placing one of said pressure intensifiers (221) in contact with said base (55) and an exterior surface of one of said legs (61) and the *other* of said pressure intensifiers (221) in contact with said base (55) and an exterior surface of the *other* of said legs (63). See Figure 1a. First, each silicone block (221) only contacts a single base, i.e., the block (221) molding sheet (53) which is bent upwardly to form rib portion (61) is a different block than the one molding sheet (58) which is bent upwardly to form rib portion (63).

It is also important to note that the Examiner did not assert that evacuating the vacuum bag caused the second pressure intensifier to press the pre-form against the other of said legs but instead stated it pressed against "the other structural assembly parts." As stated, a second block (221) does not press against rib portion (61). Also, the use of the vacuum bag on the blocks

(221) only cause pressure to the body portion (55) of the sheet (53). Col. 9, lines 27-30. Heat is required to cause thermal expansion of the block (221) to cause pressure to be applied to rib portion (61) which it appears the Examiner equates with a leg of a pre-form. *Id.* Additionally, the blocks (221) are not used to properly cure the ribs (45) and body (43) into proper shape as asserted by the Examiner in the Office Action, para. 24, page 19, lines 9-10, but are used to compress the composite sheets together, col. 9, lines 29-30.

Applicant, however, uses pressure intensifiers to apply pressure of the two legs 15 against a second pre-cured member located between the legs. Applicant's pressure intensifiers 18 also apply pressure to the base against a first pre-cured member. It is an important feature of this invention that the forces on exterior side 23 of each pressure intensifier 18 push against base 13 and a leg 15, the forces being reacted by first and second pre-cured composite structures. This is simply not taught by Barnes et al. in combination with Breuer et al., Abildskov, and Herzberg.

As the references when combined must, but do not, teach or suggest all the claim limitations, claims 24 and all corresponding depending claims including claims 27 and 43 should be allowed.

**Claim 28 Is Not Obvious.**

Claim 28, dependent upon claim 24 is nonobvious for the reasons provided above regarding independent claim 24, and for the reasons provided previously with respect to the rejection in Office Action, para. 16 regarding claims 19 and 28 over Leaversuch and Bersuch et al.

**Claim 29 Is Not Obvious.**

Claim 29, dependent upon claim 24 is nonobvious for the reasons provided above regarding independent claim 24, and for the reasons provided previously with respect to the rejection in Office Action, para. 17 regarding claims 20 and 29 over Bersuch et al. and Sheahen et al.

In Re Application of:  
Ronald P. Schmidt

Serial No. 09/761,301

Claim 39 Is Not Obvious.

Claim 39, dependent upon claim 24 is nonobvious for the reasons provided above regarding independent claim 24, and for the reasons provided previously with respect to the rejection in Office Action, para. 18 regarding claims 39 and 45 over Mueller et al. and Morris et al.

CONCLUSION

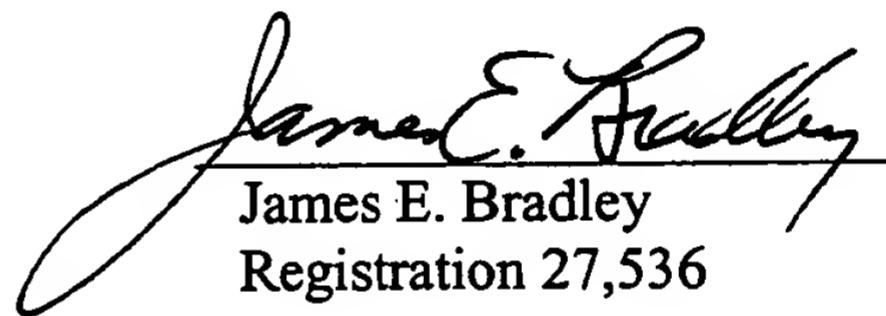
Applicant respectfully submits that the claims are now in condition for allowance and favorable action is respectfully requested. The Commissioner is hereby authorized to charge any additional fees which may be required or credit any overpayment to Bracewell & Patterson Deposit Account No. 50-0259 (TA-00414).

Respectfully submitted,

Nov 10, 2003

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